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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/783,562	02/19/2004	William W. Feng	LSTC-004	7548

37804   7590   04/13/2007
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EXAMINER
OCHOA, JUAN CARLOS

ART UNIT	PAPER NUMBER
2123	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/13/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

PTOL-90A (Rev. 10/06)

Office Action Summary	Application No.	Applicant(s)
	10/783,562	FENG ET AL.
	Examiner	Art Unit
	Juan C. Ochoa	2123

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on <u>27 February 2007</u>.

2a) ☐ This action is **FINAL.**   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) <u>21-40</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) <u>21–40</u> is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☒ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on <u>2/19/04</u> is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some * c) ☐ None of:

      1. ☐ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____.

      3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1.   The amendment filed 2/27/07 has been received and considered. Claims 21–40

are presented for examination.

Specification

2.   The disclosure is objected to because of the following informalities:

3.   Page 5, paragraph [0011], line 12, includes the misspelled term "exiting", should

be "existing".

4.   Page 10, paragraph [0046], includes the unclear term "is a material recovers".

5.   Page 12, paragraph [0057], line 3, includes the miss-referenced logic box "330".

Examiner thinks it should be "340".

6.   Page 12, paragraph [0057], line 8, includes the miss-referenced logic box "330".

Examiner thinks it should be "130".

7.   Page 12, paragraph [0059], line 2, includes the miss-referenced logic box "330".

Examiner thinks it should be "340".

8.   Appropriate correction is required.

Drawings

9.   The drawings are objected to because of the following informalities:

10.   Figure 1 should be designated by a legend such as --Prior Art--, as per

application description page 4, paragraph [0008], because only that which is old is

illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR

1.121(d) are required in reply to the Office action to avoid abandonment of the

application. The replacement sheet(s) should be labeled "Replacement Sheet" in the

page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing

figures. If the changes are not accepted by the examiner, the applicant will be notified

and informed of any required corrective action in the next Office action. The objection to

the drawings will not be held in abeyance.

Claim Objections

11.   Claims 21, 31, and 36 use the acronym or variable "μ" and "α", the first use of an

acronym or variable in a claim should be defined to avoid any possible indefiniteness

issues. While the claims set for the limitation "material coefficients μ and α", the claims

do not specify which material coefficients μ and α represent.

12.   No new matter may be introduced in the required corrections.

Claim Rejections - 35 USC § 112

13.   The following is a quotation of the first paragraph of 35 U.S.C. 112:
The specification shall contain a written description of the invention, and of the manner and process of
making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the
art to which it pertains, or with which it is most nearly connected, to make and use the same and shall
set forth the best mode contemplated by the inventor of carrying out his invention.

14.   Claims 21–40 are rejected under 35 U.S.C. 112, first paragraph, as failing to

comply with the enablement requirement.

15.   Claims 21, 31, and 36, as written, raise enablement issues. The limitation "a

plurality of stress function f(λ) values" was not described in the specification in such a

way as to enable one skilled in the art to which it pertains, or with which it is most nearly

connected, to make and/or use the invention. The subject matter description of "Fig. 5

... **infinite series** in equation 330" (see page 12, paragraph [0059], line 2) in the

specification amounts to "**a plurality** of stress function $f(\lambda)$ values". An infinite series, by

definition, is unbounded. The upper–bound of the series in 340, and not 330, is m.

Examiner notes that the disclosure objection of page 12, paragraph [0059], line 2,

including the miss-referenced logic box "330" and not "340" was raised above.

16.   The following is a quotation of the second paragraph of 35 U.S.C. 112:
        The specification shall conclude with one or more claims particularly pointing out and distinctly
        claiming the subject matter which the applicant regards as his invention.

17.   Claims 21–40 are rejected under 35 U.S.C. 112, second paragraph, as being

indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention.

18.   Claims 21, 31, and 36, as written, fail to perform the method set forth in the

preamble, more specifically "simulating structural responses of a compressible material

in finite element analysis". The limitation "evaluating element stresses in a local

coordinate system from the lookup table in accordance with a set of principal stretches

at each integration point of each of the finite elements" does not cure the deficiency.

19.   Dependent claims inherit the defect of the claim from which they depend.

Claim Rejections - 35 USC § 101

20.   35 U.S.C. 101 reads as follows:
        Whoever invents or discovers any new and useful process, machine, manufacture, or composition of
        matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the
        conditions and requirements of this title.

21.   Claims 21–40 are rejected under 35 U.S.C. 101 because the claimed invention is

directed to non-statutory subject matter.

22.   Claims 21, 31, and 36 does not produce a useful, concrete and tangible result.

The limitation "evaluating element stresses" does not reflect any described practical

utility. There is no tangible result claimed, only an abstract idea. "Evaluating element

stresses" does not equate to tangibility.

23.   Dependent claims inherit the defect of the claim from which they depend.

Claim Rejections - 35 USC § 103

24.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all
obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

25.   The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

    1.   Determining the scope and contents of the prior art.
    2.   Ascertaining the differences between the prior art and the claims at issue.
    3.   Resolving the level of ordinary skill in the pertinent art.
    4.   Considering objective evidence present in the application indicating
          obviousness or nonobviousness.

26.   This application currently names joint inventors. In considering patentability of the

claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the

various claims was commonly owned at the time any inventions covered therein were

made absent any evidence to the contrary. Applicant is advised of the obligation under

37 CFR 1.56 to point out the inventor and invention dates of each claim that was not

commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g)

prior art under 35 U.S.C. 103(a).

27.   Claims 21–27, 29, and 31–34 and 36–39 are rejected under 35 U.S.C. 103(a) as

being unpatentable over Nonlinear FEA of Elastomers-MSC Technical Paper, MSC

Software, (MSC hereinafter), taken in view of Gallagher et al., (Gallagher hereinafter),

An Efficient 3-D Visualization Technique for Finite Element Models and Other Coarse

Volumes.

28.   As to claim 21, MSC discloses a method for simulating structural responses of a

compressible material in finite element analysis (see page 3, col. 1, lines 1–6), the

method comprising: defining a plurality of finite elements and a strain-stress curve to

represent the compressible material (see page 6, col. 2, 3rd paragraph to end of col. 3);

calculating a plurality of stress function f(λ) values **without guessing unknown**

material coefficients μ and α to fit the strain-stress curve in a trial-and-error manner

(see "Automated facilities are available to help the user **determine** these **material**

parameters from test data" in page 21, col. 2, last paragraph), wherein each of the

plurality of stress function values equals to summation of a sequence of $\lambda^{(-v)^{\wedge}j} \sigma_0(\lambda^{(-v)^{\wedge}j})$

(see page 7, col. 3, 3rd paragraph from the bottom and/or page 8, col. 1, 1st and 2nd

paragraphs), where j is an integer related to j-th term of the sequence, λ is a particular

stretch ratio of interest (see page 6, col. 2, 1st and 2nd paragraphs), v is Poisson's ratio

of the compressible material (see page 8, col. 2), and $\sigma_0(\lambda^{(-v)^{\wedge}j})$ is the stress value at $\lambda^{(-v)^{\wedge}j}$ defined by stress-strain curve for the compressible material. Examiner notes that

MSC discloses calculating a plurality of stress function f(λ) values without guessing

unknown material coefficients μ and α, since the material coefficients are automatically
determined. (See "Automated facilities are available to help the user determine these
material parameters from test data" in page 21, col. 2, last paragraph).

29.   While MSC discloses a method for simulating structural responses of a
compressible material in finite element analysis, MSC lacks fails to disclose predict
teach storing the plurality of stress function values into a lookup table and evaluating
element stresses in a local coordinate system from the lookup table in accordance with
a set of principal stretches at each integration point of each of the finite elements.

30.   Gallagher discloses storing the plurality of stress function values into a lookup
table (see page 187, col. 1, 2nd paragraph); and evaluating element stresses in a local
coordinate system from the lookup table in accordance with a set of principal stretches
at each integration point of each of the finite elements (see page 191, col. 1, 5th
paragraph).

31.   MSC and Gallagher are analogous art because they are both related to finite
element models.

32.   Therefore, it would have been obvious to one of ordinary skill in this art at the
time of invention by applicant to utilize the lookup tables of Gallagher in the method of
MSC because Gallagher develops a technique that extends existing 3-D result
visualization methods for use with finite element models, where result values are only
available at coarsely spaced points throughout the volume, which represents results as
smooth isosurfaces within the volume for one or more result values, using visually
continuous, bi-cubic polynomials (see page 185, col. 1, 1st paragraph), and as a result,

Gallagher reports the following improvement over his prior art: reducing the

computational and display bandwidth of general 3-D solid visualization problems (see

page 192, conclusion, 2nd paragraph).

33.   As to claim 22, MSC discloses a method wherein the stress-strain curve is

obtained from a physical experiment of the compressible material under a uni-axial

loading condition (see "uniaxial stress-strain" in page 15, col. 2, last paragraph).

34.   As to claim 23, MSC discloses a method wherein the stretch ratio is a ratio

between deformed length divided by original length of the compressible material in one

direction (see page 6, col. 2, 1st paragraph).

35.   As to claim 24, a method wherein the sequence has a total of m terms, and m is

a positive integer, and the term of the sequence starts from 0 to m-1 (manipulation of

mathematical concepts).

36.   As to claim 25, a method wherein said calculating step is completed when

absolute value of $|\lambda^{(-v)^{\wedge}j} -1|$ is less than a threshold (manipulation of mathematical

concepts).

37.   As to claim 26, a method wherein the threshold is defined as 0.01 (manipulation

of mathematical concepts).

38.   As to claim 27, MSC discloses a method wherein the element stresses include

nominal stress and true stress (see "nominal stress" as "Engineering stress" in page 6,

col. 3, 2nd paragraph and "true stress" as "Cauchy stress" in page 6, col. 2, last

paragraph).

39.   As to claim 29, Gallagher discloses a method said evaluating element stresses in local coordinate system further includes interpolating the lookup table to obtain the element stresses at the principal stretches (see page 189, col. 1, 3rd paragraph).

40.   As to claims 31–34 and 36–39, these claims recite a computer program product and a system for performing the method of claims 21–27 and 29. MSC discloses a program (see page 4, col. 1, 1st paragraph) for performing a method that teaches claims 21–27 and 29. Therefore, claims 31–34 and 36–39 are rejected for the same reasons given above.

41.   Claims 28, 30, 35, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over MSC, taken in view of Gallagher as applied to claims 21, 31, and 36 above, and further in view of Peric et al., (Peric hereinafter), Finite-Element Applications to the Non-linear Mechanics of Solids.

42.   As to claim 28, while the MSC–Gallagher method teaches simulating structural responses of a compressible material in finite element analysis, the MSC–Gallagher method fails to teach the set of principal stretches is obtained by solving eigensolution for deformation gradient tensor at each integration point of each of the finite element.

43.   Peric discloses a method wherein the set of principal stretches is obtained by solving eigensolution for deformation gradient tensor at each integration point of each of the finite element (see page 1515, Remark 4.2, lines 1–4).

44.   MSC, Gallagher, and Peric are analogous art because they are related to finite element models.

45.   Therefore, it would have been obvious to one of ordinary skill in this art at the
time of invention by applicant to utilize the disclosure of Peric in the MSC–Gallagher
method because Peric discusses some of the relevant computational advances which
permit the simulation of large-scale problems involving nonlinear solids within realistic
time frames and computational resources (see page 1495, Abstract, lines 1–3), and as
a result, Peric reports a comparison of performances of three algorithms, in the solution
of the algebraic system of equations: profile (direct) solver, Bi-CGStab iterative solution
and multigrid. Peric shows that it is clear that both the Bi-CGStab and multigrid solution
provide a significant improvement over the standard direct solver, (i.e. improvements
over prior art), since memory requirements and CPU time have both been reduced by
approximately 7–8 times in comparison with the direct solution; Peric also shows that in
comparison with the Bi-CGStab solution, the multigrid strategy requires some small
additional storage, but shows almost twofold reduction in the CPU time (see page 1570,
figure 43(a) and page 1569, 3rd paragraph).

46.   As to claim 30, Peric discloses a method further comprises transforming the
element stresses to global coordinate system (see page 1528, last paragraph).

47.   As to claims 35 and 40, these claims recite a computer program product and a
system for performing the method of claim 30. MSC discloses a program (see page 4,
col. 1, 1st paragraph) for performing a method that teaches claim 30. Therefore, claims
35 and 40 are rejected for the same reasons given above.

Response to Arguments

48.   Applicant's arguments filed 2/27/07 have been fully considered but they are not persuasive.

49.   Regarding the claim objections, the amendment corrected all deficiencies and the objections are withdrawn.

50.   Regarding the rejections under 103.

51.   Applicant's arguments, see page 7, last 2 paragraphs, page 8, and page 10, paragraphs 1–3, with respect to claims 21–40 have been considered. Examiner has elaborated prior art disclosures of amended claims. Examiner notes that MSC discloses calculating a plurality of stress function $f(\lambda)$ values without guessing unknown material coefficients μ and α, since the material coefficients are automatically determined. (See "Automated facilities are available to help the user determine these material parameters from test data" in page 21, col. 2, last paragraph).

52.   Applicant argues, (see page 9, paragraphs 2–4), that the Examiner's articulated motivation for combining the references is in error. However, Examiner disagrees. Examiner elaborated a motivation for combining the references and not a motivation for combining the references "to come up with the invention".

53.   Applicant's arguments, see page 9, 1st paragraph and page 10, last paragraph, with respect to the Affidavit submitted under 37 CFR § 1.132 have been considered but are moot in view of the new ground(s) of rejection and the fact that the Examiner does not see the features emphasized in the Affidavit expressed in the claims. Examiner is not allowed to bring limitations set forth in the description into the claims.

54.   Therefore it is the Examiners position that the cited references do anticipate the

claims and the rejections are maintained.

Conclusion

55.   Examiner would like to point out that any reference to specific figures, columns

and lines should not be considered limiting in any way, the entire reference is

considered to provide disclosure relating to the claimed invention.

56.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Juan C. Ochoa whose telephone number is (571) 272-

2625. The examiner can normally be reached on 7:30AM - 4:00 PM.

57.   If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Paul Rodriguez can be reached on (571) 272-3753. The fax phone number

for the organization where this application or proceeding is assigned is 571-273-8300.

58.   Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for published

applications may be obtained from either Private PAIR or Public PAIR. Status

information for unpublished applications is available through Private PAIR only. For

more information about the PAIR system, see http://pair-direct.uspto.gov. Should you

have questions on access to the Private PAIR system, contact the Electronic Business

Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO

Customer Service Representative or access to the automated information system, call

800-786-9199 (IN USA OR CANADA) or 571-272-1000.

*** ___ 4/5/07

PAUL RODRIGUEZ   4/12/07
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